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EXAMINER
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MINSKEY, JACOB T

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1791

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



## **DETAILED ACTION**

### ***Response to Arguments***

1. The Examiner acknowledges the amendments to claims 1-15, the cancelation of claims 16-26 and the addition of claims 27-39.
2. Applicant's arguments with respect to claims 1, 3, 9, 12, and 13 have been considered but are moot in view of the new ground(s) of rejection.
3. As previously stated, the limitation of the activation time being less than 10 seconds was not previously given weight, due to the 112 rejection. The amendment to the independent claim clarifies the limitations and now requires that the activation time is not "short" but instead a specific time is presented. The activation time of less than 10 seconds overcomes the previous anticipation rejection, and thus requires a new search and consideration.
4. A new ground of rejection based on that search is presented below.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:  

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
6. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. Claim 2 does not state what is "predominantly" <10 mm. It is not stated what this is measuring (length, diameter, etc.). The arguments presented inform the Examiner

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that the measurement is intended to be diameter, but there was no amendment to the claim. The Examiner is required to give the broadest reasonable interpretation of the claims, and finds the language to still not be clarified.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**11. Claims 1-4, 8-15, 27-30 and 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klungness et al, USP 5,223,090 in view of Virtanen, USP 6,416,727.**

12. Regarding claim 1, Klungness teaches a method for precipitating mineral particles on fibers to be used in manufacturing paper comprising adding a fiber material in a precipitation reactor, the refiner (column 7 lines 5-12); providing a fiber material comprising fibers to be used as a raw material for the paper pulp, the fibers in the fiber material having a certain capacity for bonding and providing a reactive mineral material (calcium hydroxide, column 1 lines 25-29, column 6 lines 8-17, column 7 lines 7-12); mixing the mineral and fibers (column 6 lines 8-17 and column 7 lines 7-12); calcium hydroxide and fibers are combined to form a suspension (column 6 lines 8-17); carbon dioxide is added to precipitate out the reactive mineral (column 7 lines 16-20); wherein the refiner plates act as a precipitation zone within the reactor (column 7 lines 5-12) and the calcium hydroxide and fibers are combined to form a suspension (column 6 lines 8-17) in order to activate the fibers to enhance fiber bonding (column 7 lines 16-20) for less than a second (see abstract). The fibers with precipitated calcium carbonate are then discharged from the refiner (column 7 lines 35-40 and 47-60).

13. Klungness is silent on dispersing the fiber suspension in drops or particles into the precipitation reactor or that there is a gas space created in the refiner.

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14. In the same field of endeavor of precipitating calcium based deposits on fibers for papermaking, Virtanen teaches precipitating calcium carbonate in a manner so that the calcium hydroxide is dispersed in a mist (which the Examiner states reads on the limitation of drops), and then precipitates out in carbon dioxide (see abstract).

15. It would have been obvious to one of ordinary skill at the time of the invention to utilize the fiber loading process of Klunness with the teachings of dispersing the fiber/calcium hydroxide as a mist through carbon dioxide as taught by Virtanen for the benefit of utilizing a process with the known benefit of using only 1/1000 of the energy of the liquid phase dispersion (see Virtanen, column 3 lines 39-50). It would only be a simple substitution of one known method for another that will provide predictable results to use a pin mill refiner system to be capable of both in situ calcium carbonate formation and use with fiber systems.

16. Regarding claims 2 and 29, Virtanen further teaches the use of a 'mist' [abstract], and that that reaction time of the process increases as surface area increases [column 4 lines 4-13]. Smaller volume droplets for the same total mass have a higher surface area. Therefore it would be prima facie obvious to optimize droplet size and thus increase the reaction rate.

17. Additionally, the instant specification that "the small liquid drops, fibres and other solid matter particles disperse into the gas space to form an almost mist-like gas suspension." It would have been obvious that the mist of Virtanen would have read on

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the size limitations of the instant claims, as the instant application utilizes the same term to describe an acceptable sized object.

18. Regarding claims 3-8 and 34, Klungness further discloses that the activation zone occurs at the beginning of the reactor (column 7 lines 16-20) is less than one second (see abstract).

19. Regarding claims 4 and 30, Klungness further teaches activating the fibers by grinding and fibrillating them in a disk refiner (reads on fibrillating or refining, column 7 lines 15-40). Additionally, the pin mill of Virtanen would also serve to grind the pulp and therefore activate it (column 5 lines 20-23).

20. Regarding claims 9-10, 28, and 35-37, Klungness further teaches that the gas utilized is carbon dioxide with a purity of 90% or more which is added as a pressurized gas (column 7 lines 23-24).

21. Regarding claim 11, Klungness and Virtanen remain as applied in claims 1 and 10 above and Virtanen further teaches that the precipitation reactors (the pin mill refiners) can be connected in series (see figures 1a and 1b). The 90% pure gas that is utilized is considered to read on the limitations of this claim. The movement of the pure gas in series from one reactor to the next will implicitly teach that the gas will be less rich in carbon dioxide from the reaction that have already taken place.

22. Regarding claims 12 and 27, Klungness further teaches that calcium hydroxide is added to change the desired opacity of the paper [column 2 lines 7-11].

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23. Regarding claim 13, Klungness further teaches chemical and mechanical pulps [column 1 lines 58-60].

24. Regarding claim 14, Klungness further teaches chemical pulps (column 1 lines 58-60). All chemical pulps contain residual mineral impurities such as sodium carbonate and other substances not removed during screening such as excess dirt, and a mechanical pulp contains fiber based fines.

25. Regarding claims 15 and 38-39, Klungness further teaches that the pulp is fed at 5 to 15% consistency which overlaps with the instant claimed range (column 7 lines 5-10).

**26. Claims 5-7 and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klungness et al, USP 5,223,090 in view of Virtanen, USP 6,416,727.**

27. Regarding claim 5, Klungness and Virtanen remain as applied above, but are silent on the specifics of the blades and speeds of the blades used in the activation zone.

28. Virtanen teaches (as described above) a pin mill mixer which will supply impact and counter impacts as it is the same device as the instant claim (see Figure 3) and an impact mill type flow through mixer, a pin mill mixer. Virtanen further teaches that every other cage can act as a rotor (as shown in Figure 4) or all the cages can act as a rotor (as shown in Figure 3). These cages include grinding pins which the examiner has



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interpreted as blades (column 5 lines 10-22). The suspension flows through the pin mill mixer/refiner as shown in Figures 3 and 4

29. In another reference by Virtanen (hereafter referred to as '454), a pin mill (just as the original Virtanen references utilizes a pin mill) provides that a pin mill should be run at a speed of 20-200 m/s.

30. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to run the pin mill at the speed disclosed by '454 publication, because both references are provided by the same inventor, leading an average artisan that the teachings are transferable and the more detailed reference will provide a proffered explanation on the settings of the matter.

31. Additionally, it would have been prima facie obvious to optimize the speed of the concentric rotors as speed has a direct effect on the refining of the fibers and hence the uptake of precipitated calcium carbonate (see Klungness, column 7 lines 13-15). This teaching is comparable to the rotating of the cages of '454.

32. Regarding claims 6-7 and 31-33, Virtanen further teaches a pin mill with 5 rings (see Figures 3 and 4) that operated in opposite moving directions (see Figure 3) at a speed of 20-200 m/s (see claims) so that carbon dioxide can be fed into the activation zone)at different intermediate stages of the carbonating process (column 4 lines 65-67 column 5 line 1-4) as the pressure and rotation forces the suspension outwards. The mixing of the slurry with the activation of the fibers through the refining and precipitation of the minerals is inherent to the milling process as described in the rejections above and commonly understood by an average artisan in the field of endeavor.

***Conclusion***

33. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACOB T. MINSKEY whose telephone number is (571)270-7003. The examiner can normally be reached on Monday to Friday 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTM

/Richard Crispino/  
Supervisory Patent Examiner, Art Unit 1791